Horizontal Gene Transfer in the Pozas of Cuatro Cienegas

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Genomes are remarkably dynamic. Genomic analysis of prokaryotes reveals that genes move not only within an individual genome but can and do between genomes, even ones that are 'unrelated". So what fuels this commodities exchange of DNA and how is it accomplished? Can the limits of exchange be understood? How informative/valuable are the clues to past events of transfer? These statements and questions demonstrate that our understanding of gene transfer is in its infancy, nominally qualitative and retrospective in nature. We are investigating horizontal gene flow in bacteria by integrating genomic analysis, microbial ecology, and population dynamics through experimental selection systems. Using the major heterotroph (Bacillus species) and the primary producer (Calothrix) of a desert thermal spring system as our baseline genomes, we report on experiments that will allow us to look at snapshots of these genomes as genes move in and out of the population. Our interdisciplinary protocol allows an unprecedented view into the role horizontal gene transfer plays in prokaryotic genome evolution.